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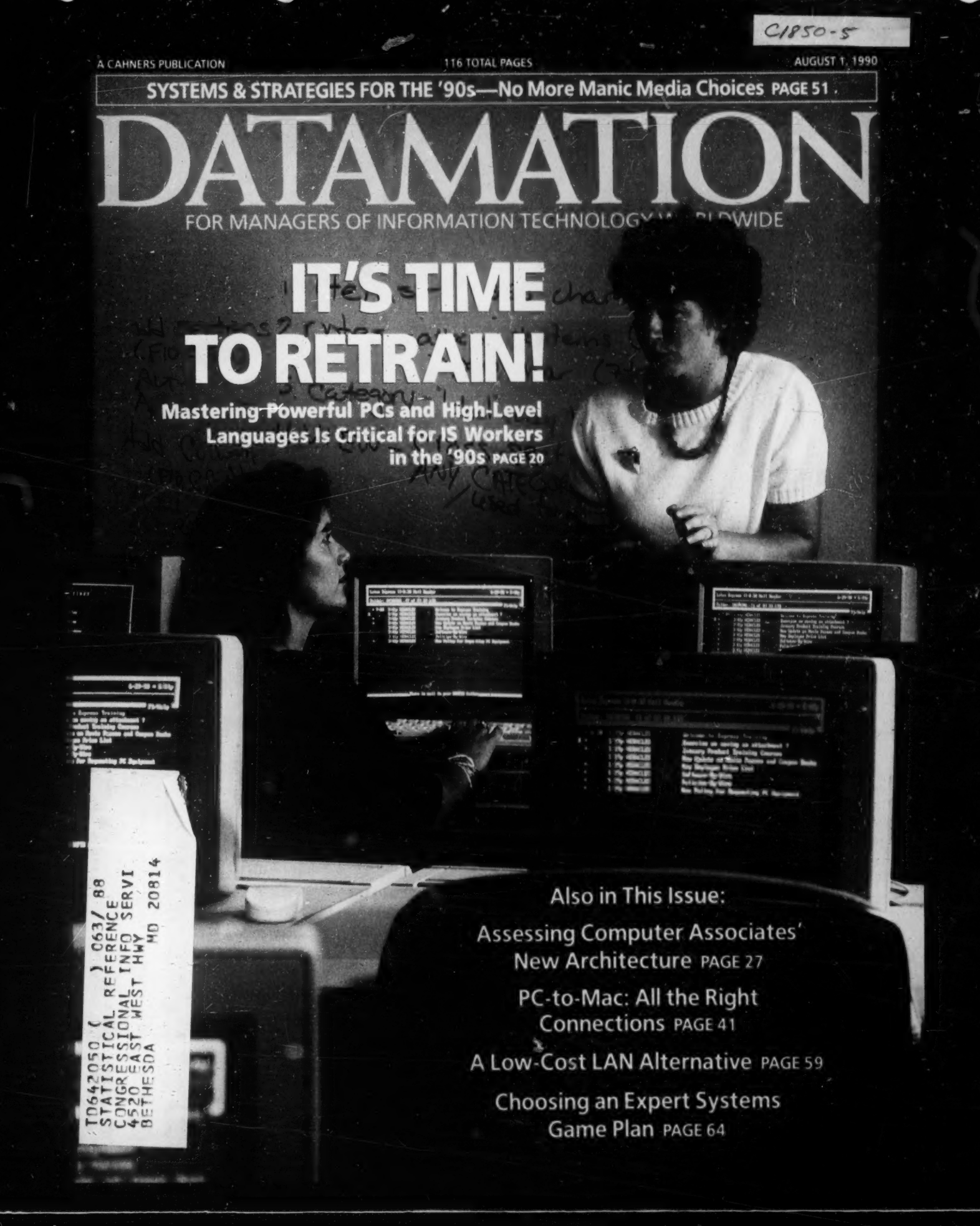
SYSTEMS & STRATEGIES FOR THE '90s—No More Manic Media Choices PAGE 51

DATAMATION

FOR MANAGERS OF INFORMATION TECHNOLOGY W[illegible]RLDWIDE

IT'S TIME TO RETRAIN!

Mastering Powerful PCs and High-Level Languages Is Critical for IS Workers in the '90s PAGE 20



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PC-to-Mac: All the Right Connections PAGE 41

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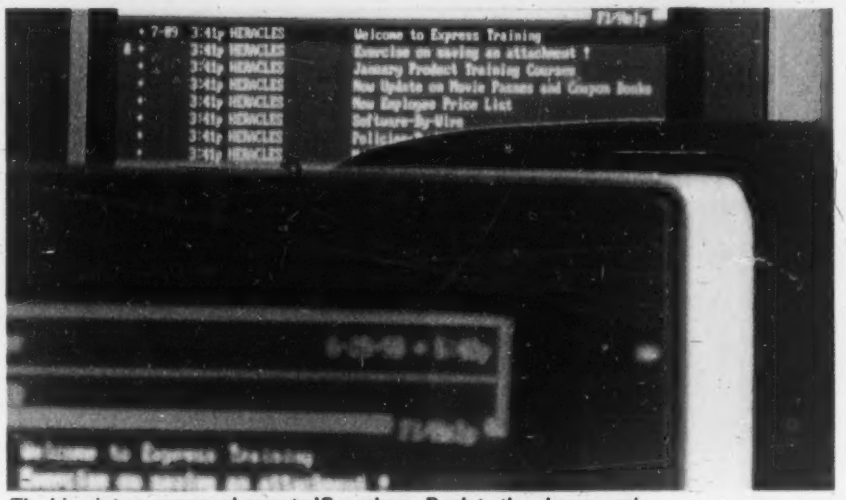
COVER STORY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New Employee Price List
Software-By-Wire

The big picture comes clearer to IS workers: Back to the classroom!

It's Time To Retrain! 20

BY JEFF MOAD New technologies and applications require new skills. But where will they come from? Veteran IS workers who don't retrain may be replaced by new talent.

Cover photography by David Bradley

SOFTWARE

STRATEGIES

Assessing Computer Associates' New Architecture 27

BY RALPH CARLYLE Just when you thought you understood the difference between SAA and NAS, along comes another architecture—CA90s. Like the blueprints from IBM and Digital, this one from Computer Associates offers more promises than products.

INNOVATORS

Mass. Miracle Goes Soft(ware) 33

BY CHRIS SIVULA As hardware companies take a downturn in Massachusetts, many former employees are turning to software development. A software start-up, they've found, requires little overhead. All you need is a computer, an idea and a garage.

INSIGHTS ON DISTRIBUTED COMPUTING

We just left his NetWare 286 server in place on the network, attached and logged the Macs into that, and used the 286 server as a router to the 386 server.

Mike Drake
Evernett Network Resources Inc.
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We're trying not to make computer use a religious battle. We support DOS, Macintosh OS and UNIX and attempt to let each person use the paradigms they're accustomed to.

Anthony Torti
Brown University
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Our real focus is connectivity and communications, not sheer processing power. We are moving in the direction of networking wherever we can to share and standardize our applications.

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BY LEILA DAVIS Network specialists say that the variety of transmission media available has enabled users, whatever their needs, to choose the best option for each job with a minimum of trade-offs.

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A Low-Cost LAN Alternative 59

BY JOHN McMULLEN Conventional wisdom casts doubt on the prospects of multiuser PC computing on anything other than LANs. But a few radical souls have found another solution that costs less and often performs just as well.

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BY C. LAWRENCE MEADOR AND ED G. MAHLER Giants DuPont and Digital follow strikingly different game plans in their quests to implement expert systems. One goes for the base hits; the other swings for home runs. Which choice is right for you?

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BY JEFF MOAD They said it couldn't be done, but Mike Simmons turned Bank of America's volatile IS operation around after four guys went down trying. Now on his way to Bank of Boston, he takes time out to give IS managers a piece of his mind.

Simmons dares top IS management to come out of the glass house.

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How Europe Is Using CASE 79

BY JAY PRAKASH European companies are more cautious than their U.S. counterparts about investing in new CASE technologies. But users in search of improved quality and lower costs are making Europe the world's second largest CASE tool market.

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Traffic Technology Is Taking Off 85

BY PEGGY TRAUTMAN The European Community is pinning its hopes on applying information technology to traffic management as the best means for alleviating Europe's increasing transportation congestion.

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The Huffin' and Puffin' Is Worth It

In my younger years, I never believed the old guys who wagged their fingers at me and said that someday my midsection would sag, my eyes would droop and the hairs on my head would thin and turn gray. Why should I have believed them? I was young and indestructible, and I could only foresee my condition as I had always enjoyed it. I was a lean, mean, fighting machine, and I figured I'd always be so.

But the old wags were wise, and I guess that's how they got to be old wags. As the years went by, I learned how easy it was to fall into disrepair, that comfort was a danger sign and that the value of change was renewal. I had to stay in shape to meet the challenges of tomorrow. And it's a lesson that's particularly applicable in our industry today. For IS men and women, the challenge is to keep skills in shape in the face of rapidly changing technologies and individual company's organizational requirements. In many companies, it's a question of either shaping up or possibly shipping out.

Photograph by David Bradley

TRAINING MOAD

As senior writer Jeff Moad says in our cover story this issue, "It's Time To Retrain!" p. 20, "In the fast-moving world of information systems and technology, it has always been a challenge for programmers, analysts and managers to keep their skills up to date . . . In the past, those workers may have been shifted into software maintenance jobs or even kicked upstairs into middle management positions that justified their higher salaries. But times have changed. Most IS executives are facing tighter budgets and pressure to downsize and flatten organizations. That means less room for middle managers in IS."

What it really means is that the onus is on you to develop the skills and expertise needed in the years ahead. You've got to get in that fighting spirit. Go lean! Go mean! Tone up those portable operating system abdominals! Pump those graphical user interfaces! Loosen up those LAN back muscles! As Tommy LaSorda says, "If I can do it, you can do it." It may take some huffin' and puffin', but in the end you may just end up one of those wise old wags.

Of Architectures and Network Media

What the world's largest independent software company does, or does not do, is just about always important to information-processing professionals. When Computer Associates International Inc. rolled out its CA90s architecture to link together many of its system software products, we figured we'd better take a hard look at it. In exploring Computer Associates' new architecture, senior writer Ralph Carlyle reaches some interesting conclusions. Turn to page 27 for Carlyle's assessment. And in the latest installment of our continuing series, Systems & Strategies for the '90s, contributing editor Leila Davis takes a look into the world of network data transport media. In "No More Manic-Media Choices," p. 51, Davis reveals that things have gotten a whole lot better for users.

David R. Brousell, Editor

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Mass. Miracle Goes Soft(ware)

As hardware companies take a downturn in Massachusetts, many former employees are turning to software development. A software start-up, they've found, requires little overhead. All you need is a computer, an idea and a garage.

BY CHRIS SIVULA

Tonight, in some cramped office near Boston, a couple of software developers are working late. They are a fledgling company's only employees, its sole officers and its lone asset. Revenues coming into the company's coffers total exactly zero.

By the end of the decade, they'll both be millionaires. If their company's name isn't a household word, its software will at least be well recognized in whatever niche it's aimed at. It's possible, perhaps likely, that the code they are writing will become an industry standard and will have a major impact on your future systems plans.

Don't ask the name of this company, because no one knows. Yet it is out there. Software is still a business that attracts such entrepreneurs.

People who say the computer industry has matured are talking about hardware. The software industry is a wide-open field, where anyone with a good idea, technical skills and access to a computer can still strike it rich. "It's a wild and crazy market right now," says David Lampe, assistant director of corporate programs at the Massachusetts Institute of Technology in Cambridge, Mass.

Lampe has some experience following Massachusetts' link to technology-based businesses. He authored *Massachusetts Miracle: High Technology and Economic Revitalization* (Cambridge, Mass: MIT Press, 1988), and now has a second book coming out that reexamines the state's high-tech industries.

"[Massachusetts] has been an area of innovation almost since it was founded," says Lampe. In fact, the New World's first foundry was built near Boston. Early colonists established shipyards and began exporting finished products to Europe. In the mid-1800s, Massachusetts was the nation's industrial center. Fittingly, the state's largest computer company—Digital Equipment Corp.—is headquartered in a pre-Civil War textile mill in Maynard, Mass.

And, despite Massachusetts Governor Michael S. Dukakis' admission last year that the Massachusetts Miracle is over, the Bay State may be the best place in the world for a start-up software company to seek its fortune.

Plenty are trying. The Massachusetts Computer Software Council's directory lists 800 software companies. Although the council's list isn't a complete one—some unknown number of software companies are not included—it's the most comprehensive directory available. The council's statistics reveal an industry that is about as mature as the California gold-mining business was in 1849. Consider that nearly 70% of the software companies in Massachusetts were launched since 1980 and about 20% since 1985.

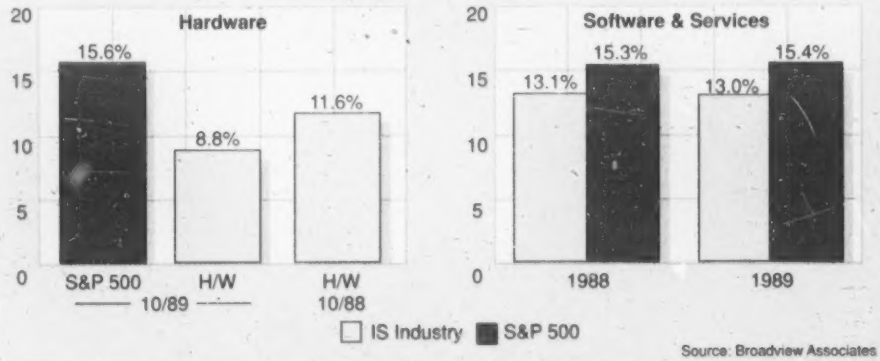
Hardware's Loss, Software's Gain

Certainly, Massachusetts has been home to some software industry giants, including Cullinet Software Inc., Lotus Development Corp. and McCormack & Dodge Corp. But the backbone of the state's software industry is formed by a preponderance of small companies. Some 44% employ 10 people or fewer; 68% employ 25 people or less. In all, 86% are privately held. Of the 800 companies in the council's directory, 70% provide revenue figures. A full 41% report annual sales under $1 million, and another 33% indicate annual sales between $1

How Software Stacks Up

Although slightly below average, software and services companies beat hardware companies when compared against the Standard & Poor's 500 index.

MEDIAN RETURN ON EQUITY



Source: Broadview Associates

million and $5 million.

Still, taken together, Massachusetts software firms are formidable, providing nearly 46,000 jobs in Massachusetts and roughly 300,000 jobs worldwide. More than a handful are growing at rates of 25%, 50% and even 100% each year.

Applications run the gamut, from computer games to large-scale databases. There are some noticeable patterns in the mix, however. About 42% are aimed at horizontal markets and 41.5% at vertical markets. Another 14% sell software development tools and systems. Thirteen companies listed in the council's directory specialize in artificial intelligence.

It's not entirely coincidental that Massachusetts software companies are experiencing a boom while the state's hardware manufacturers are closing plants and laying off workers. The turmoil in the state's minicomputer industry provides incentive for talented technicians who might have been considering an entrepreneurial move anyway.

According to Paul Deninger, who follows the Massachusetts software industry for the investment bank Broadview Associates, it's not the first time a decline in one high-tech industry has fueled progress in an emerging technology.

The state's minicomputer manufacturers got a boost from the decline in space-related business in the 1960s, points out Deninger, a principal of the Ft. Lee, N.J., firm, which specializes in mergers and acquisitions in the IT industry. "Now we're going to see a huge spin-off into software. [Massachusetts hardware companies] are definitely in decline," he says. "I believe we've already begun to see new trees sprouting from fallen trees."

The attraction of software is simple enough, says Deninger. First of all, it costs next to nothing to launch a software start-up. "These are not products that come out of a research and development program where millions are spent. It's a couple of people with great ideas and great skills. The need for capital comes later, when it's time to go to market."

That makes a software company not only easier to start than a hardware company but easier to sustain. A small software company can plug along for years on a slow growth path and still make money. "But an entrepreneur in the hardware business has got to hit a home run to have a financial success," Deninger says.

Software also offers a better return on investment than hardware, according to

Seven Software Successes

Here's a sampling of Massachusetts software houses experiencing meteoric growth.

COMPANY	LOCATION	FOUNDED	OWNERSHIP	MASSACUSETTS CONNECTIONS
AICorp Inc.	Waltham	1975	Stock offering filed with the Securities and Exchange Commission in May.	President and CEO Robert Goldman is former head of Cullinet Software.
Business Software Technology	Westborough	1984	Now a division of publicly traded Legent Corp. of Vienna, Va.	The five founders are former Cullinet Software employees.
Index Technology Corp.	Cambridge	1983	Publicly traded	Founders were part of a group from MIT that started the Index Group consulting firm in 1969.
Interactive Images Inc.	Woburn	1981	Privately held	President and CEO R. Douglas Kahn was previously a vice president at McCormack & Dodge. Other officers came from Cullinet and Digital.
Marcam Corp.	Newton	1980	Privately held	Cofounder Paul Margolis, Harvard Business School graduate; early career at a Waltham, electronics firm, Keltron Corp.
Progress Software Corp.	Bedford	1981	Private	Three founders are MIT graduates. They left MITROL, a Woburn software house with connections to MIT, to form Progress.
Software 2000 Inc.	Hyannis	1981	Privately held	Founder Robert Pemberton held management positions at State Street Bank and Trust in Boston and Boston Safe Deposit and Trust. Other officers attended Babson College, Boston University, Harvard and Northeastern University.

studies conducted by Broadview Associates. The firm's figures show a median return on equity for hardware manufacturers at 8.8%, versus a 13% return for software and services. "The numbers say that software is the place to be," Deninger adds.

The hot new companies experiencing such gigando growth have bet their futures on trends that have emerged only in the past decade, says Deninger. The software firms specializing in traditional, centralized mainframe applications aren't finding the same success, he adds.

For instance, Hyannis, Mass.-based Software 2000 Inc. tied its product line to the IBM midrange market, first providing software for the S/3X machines and now the AS/400. The software isn't particularly exotic, basic accounting and human resource packages, but chief executive officer and chairman of the board Robert Pemberton saw uncharted territory when IBM announced plans to enter the midrange.

Finding an underserved niche is the primary path to success for start-up software houses, says Lampe. At Software 2000, it's paid off in a big way. The company has a compound annual growth rate of 100% over the past six years. The company went from zero earnings as a start-up in 1981 to $22 million last year.

Pilgrims' Progress

Still, at least one of Massachusetts' small powerhouses is bucking the trend. Progress Software Corp. of Bedford, Mass., unlike its brethren in uncrowded niches, is out of the trenches and up against Oracle Corp. and other giants in the relational database market.

Chad Carpenter, vice president of sales and services, attributes the small firm's success against the Goliaths partly to Progress' reliance on direct sales and specialized resellers. Initially, Progress executives spent a lot of time trying to line up the support of big hardware companies. Now, they think that strategy would have left them lost in a crowd of competing relational database management system vendors.

The phenomenal growth of Progress and a number of its Massachusetts neighbors is no accident, says Pemberton. The Bay State has been tied to software development since the days when programmers adjusted analog switches. The legacy is an infrastructure that may be unmatched anywhere in the world.

"When I look for new services or suppliers, I don't have to explain that soft-

1ST PRODUCT INTRODUCED	PRODUCT DESCRIPTION	# OF USERS	# OF EMPLOYEES	COMPOUND ANNUAL GROWTH	REVENUES ($ MILLIONS)
1981	Expert systems development tools and natural language database query systems	600+	125	25% over the past two years. (Sales of AICorp's initial product, Intellect, declined 60% last year. Revenues from its latest product, KBMS, jumped 106% to about $9 million.)	15
1985	Automated software management systems for IBM's DB2 relational database	400+	120	77% over last four years	14.7
1984	CASE tools for IBM product line	1,500	350	40% over the past four years	38
The company made a false start in Unix workstations bundled with executive information systems before its successful turn to DOS and OS/2 software in 1984.	EASEL, a DOS- and OS/2-based software development package for graphical user interfaces	200+	120	75 to 125% each of last five years	10-15
After consulting in the MAPICS market, Marcam introduced its PRISM software in 1986.	IBM midrange planning and control software for process-manufacturing industries	200	150	80% over past three years	17
1984	4GL and relational database system	25,000	250	65% over the past four years	25.4
1983	Financial, human resources and environmental management packages for IBM's AS/400	500+	240	100% for six consecutive years	22

ware is not lingerie. My printer also does Lotus, and my furniture dealer supplies McCormack & Dodge," Pemberton says. Some Boston law firms specialize in the legal needs of software houses. And although venture capitalists will go to Borneo if there's a potential for profit, it can't hurt that there are a number of venture capital firms specializing in computer firms headquartered in Massachusetts. Such an infrastructure makes his business more efficient, Pemberton adds.

A Place for the Best and Brightest

The state's small software companies also get a boost from the industry's frequent mergers and acquisitions. "It's very easy for an acquisition to force some of the best and brightest to look for other turf," says Richard Carpenter, chairman and CEO of Index Technology Corp., a Cambridge firm that started in 1983 and now claims the largest user base of any computer-aided software engineering (CASE) tool vendor.

When Garden City, N.Y.-based Computer Associates International Inc. purchased Westwood, Mass.-based Cullinet, for example, it unleashed a lot of software talent on the job market. Cullinet employees—some anticipating a forced relocation, some fearing a loss of entrepreneurial spirit, and some who were encouraged to leave—began to look for new companies.

☐ People Who Say The Computer Industry Has Matured Are Talking About Hardware.

Business Software Technology of Westborough, Mass., was a natural place for some of the Cullinet refugees to land. The company was founded in 1984 by Steven Velloff and four other former Cullinet employees to serve as trouble-shooting consultants for Cullinet's customer base.

BST's first success was an accounting package developed for Boston-based John Hancock Mutual Life Insurance Co. through an arrangement to trade consulting services for computer time. BST sold the package to Cullinet and made money.

The company didn't take off until it turned to IBM's DB2 market. In 1987, BST introduced its first systems management and control software for IBM's relational database. The move proved to be a good one. The lack of competitors offering CASE tools for DB2 meant BST had a lot of running room. The company, now the BST Division of Legent Corp. following a recent merger, has grown at a compound annual rate of 77% to $15 million.

Of course, most of Massachusetts' small software companies won't experience such phenomenal growth. Many will fail. Still, software continues to be a more attractive lure for talent than the huge hardware houses. "Hardware has had its day," says Lampe.

Most businesses have already made huge investments in computer hardware; now they are looking for applications that take advantage of the installed base. It looks like there will be software companies enough to meet those needs. "Most projections," says Lampe, "are that it will continue to grow." ▭

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How Europe Is Using CASE

European companies are more cautious than their U.S. counterparts about investing in new CASE technologies. But users in search of improved quality and lower costs are making Europe the world's second largest CASE tool market.

BY JAY PRAKASH

In Western Europe, as in the U.S. and Japan, computer-aided software engineering (CASE) is beginning to be recognized as a key to improving software quality and productivity.

Since 1986, Strategic Focus of Milpitas, Calif., has conducted numerous studies on CASE markets in Europe, Japan and the United States. By examining survey results, particularly between the United States and European countries, Strategic Focus has uncovered some interesting trends in the use of CASE tools.

For the purposes of this article, CASE technology is defined to include planning, analysis, design, prototyping, code generation and reverse-engineering tools. Project management tools that are integrated with other CASE tools are also included. In Europe, as elsewhere, CASE tools have been developed for two broad categories of software: IS applications—standard financial, inventory control or order-entry packages—and engineering/embedded applications—as avionics, computer-aided design and manufacturing (CAD/CAM), and microprocessor software.

The worldwide market for CASE tools suited for IS applications development was $550 million in 1989—five times as large as the market for CASE tools used for engineering/embedded software development. Europe is the second largest geographic market for IS-type CASE tools, with a 30.5% share; Canada and the United States together are first with about 50%; and Japan is third with 15.3%.

Reasons for using CASE technology and products are consistent throughout Europe and the United States. The top three reasons cited in our recent surveys are improving software quality, reducing man-months per project and reducing maintenance costs.

One reason CASE tools are not used more extensively in Europe may be prototyping. European users place more importance on prototyping than do their U.S. counterparts, and they are not at all pleased with the quality of current software prototyping tools. In fact, a majority of European IS, engineering and system software developers cite prototyping as the area that needs the biggest improvement in CASE tools.

Software developers who don't currently use CASE tools most often say they don't understand CASE technology or the capabilities of the tools. Other reasons they give include "lack of management commitment" and "value of CASE being uncertain."

In general, European companies are more cautious than their U.S. counterparts about investing in emerging technologies like CASE. Budgets in Europe for hardware and for software development tools are generally smaller than those in the United States, although such budgets in large organizations having revenues of $1 billion or more, may be comparable to U.S. corporations. IS staff in these organizations also share a level of sophistication in their understanding and implementation of software-engineering technologies similar to their counterparts in the States.

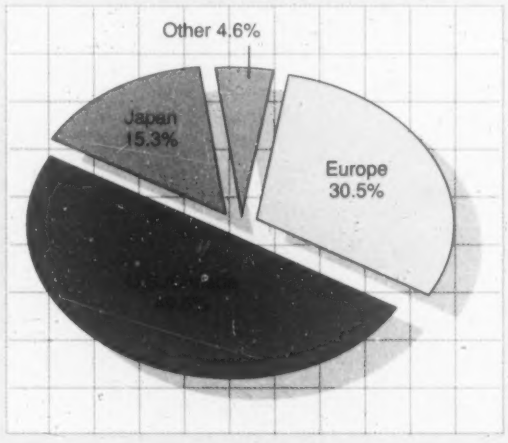
Although the percentage of CASE tool use is still small in both Europe and the United States, it should increase in both continents. A recent study done by Strategic Focus on the U.S. CASE market found an average of 23.3% of all IS software is being developed at CASE tool user sites with design tools. This corresponds to several case studies in which European users say one in four IS software projects are being developed using CASE tools. The U.S. figure is expected to double in two years.

The dominant industries in Europe using CASE tools to develop IS applications are simi-

CASE by Continents

Europe currently holds a healthy 30.5% share of the worldwide market for CASE tools used for IS applications.

1989 MARKET: $550 MILLION



Source: Strategic Focus

lar to those in the United States: manufacturing and financial services. In the States, use of CASE tools within manufacturing is distributed between process industries, software houses, computer, communications and aerospace companies. In Europe, the computer and communications sector is the dominant manufacturing segment using CASE tools. Within these sectors, the number of companies with more than 200 software developers is fewer in Europe than in the United States. However, Europe probably has a greater number of small companies with less than 10 software developers.

CASE Computing Environments

At most end user sites in Europe, computing environments are still based more on host/terminal architectures than on distributed computing schemes. CASE tool vendors such as Softlab of Munich and CGI Informatique of Paris derive over 90% of their revenue from mainframe-based environments.

For IS applications development, IBM is the dominant mainframe platform in Europe, followed by Digital Equipment Corp. In minicomputers, however, Digital systems are more frequently used than IBM's, followed by Hewlett-Packard Co. and Groupe Bull SA. This situation is similar to that in the United States except that Digital's presence in Europe is nearly 10 times stronger than it is in the States. In our study, 22% of survey respondents in Europe indicated they are using Digital as the primary mainframe software development platform, compared with 2.8% in the States.

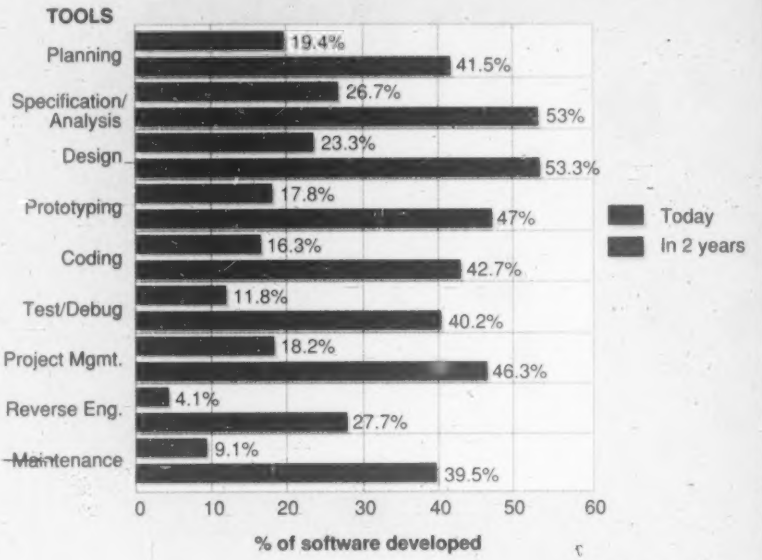
☐ EUROPEAN USERS ARE CAUTIOUS ABOUT INVESTING IN CASE TOOLS.

The mainframe-centered software development environment in Europe is quickly changing, however, with workstation vendors such as Sun Microsystems Inc., Digital and others reporting record European sales. Digital workstations are used by a greater number of IS software developers than Sun's; this situation is reversed in the United States. Also, HP workstations are used by more software developers in Europe than in the States.

For engineering applications, Digital mainframes and minicomputers, as well as Sun and Digital workstations, are used by more European software developers than are any other platforms.

A Look at the U.S. Market

U.S. software developers use CASE design tools as often as their European counterparts, although Europeans make greater use of project management tools.



Source: Strategic Focus

Microcomputers from Apple Computer Inc. are more popular as software development platforms in Europe, at 12% of survey responses, than they are in the United States, where only 1.4% of developers use them for this purpose. As in the States, the PC-based software development market is dominated by IBM (60%), Compaq Computer Corp. (25%) and other makers of IBM PC compatibles (52%).

In terms of software development environments, the Integrated Project Support Environment (IPSE), is still in its infancy in both Europe and the United States. A perception exists in many U.S. organizations, however, that the Europeans are ahead. Certainly, some large organizations in Europe, such as British Telecom and Thomson CSF in France, have invested heavily in implementing these environments. Numerous technical hurdles remain before a true low-cost IPSE can be implemented, and most companies have neither the resources nor the understanding to implement a customized IPSE.

As with other emerging technologies, several initiatives are under way toward establishing CASE standards. One such major initiative in Europe is to make a standard of the Portable Common Tool Environment (PCTE), which is one of the end products of the European Community's European Strategic Program for Research in Information Technologies (ESPRIT). PCTE is an interface that makes any CASE tool set platform independent. Although some degree of support from the major computer vendors such as Digital, Hewlett-Packard and IBM is emerging, most of the independent CASE-tool vendors are hesitating, and few implementations of this environment exist. As Thor Johnson, director of marketing at Cadre Technologies Inc. in Providence, R.I., observes: "We have a healthy respect for PCTE+, [the latest version of PCTE]; however, we have to wait for implementation at the operating-system level by the computer vendors before we can support it."

Structured Methods

Among the structured methods that are used to form the foundation for front-end CASE tools, Yourdon-DeMarco is a strong favorite with both U.S. and European software developers. The James Martin approach (supported in CASE tools from Texas Instruments Inc. of Dallas and KnowledgeWare Inc. of Atlanta) and the Jackson method, (which originated in Britain), are tied for second place in Europe, but are not among the top three methods of choice in the United States. After Yourdon-DeMarco, U.S. developers favor various in-house methods and Gane & Sarson. Complicating matters somewhat is the fact that each European country has its own popular method. For example, Structured System Analysis and Design Method (SSADM), which was developed by CASE vendor Learmonth Burchett Management Systems (LBMS) of London, is mandated on all U.K. government software projects, and Merise is commonly used by

many IS software developers in France.

Object-oriented design (OOD), an approach that represents a fundamental break with the traditional function- or data-oriented approaches, appears to have a greater level of acceptance among software developers in Europe than in the States. This acceptance was evident in the European Fighter Aircraft Program's recent major contract award to British-based IPSYS Software PLC to supply the IPSYS tool set, which is based on the Hierarchical Object Oriented Design (HOOD) method. Originally specified and developed by the European Space Agency, HOOD now will be used by all the fighter consortium partners (British Aerospace, U.K.; MBB, West Germany; CASA, Spain; and Aeritalia, Italy) and their subcontractors to design computer software for the aircraft and the subsystems. "We are seeing increased usage of OOD techniques on Sun platforms and greater sales of C++ through our Catalyst program in Europe relative to the U.S.," observes Steve Martino, manager of CASE market development at Sun.

☐ IT'S IMPOSSIBLE TO CHARACTERIZE A TYPICAL EUROPEAN CASE USER.

Use of C and C++ should continue to increase among users on both continents. Also on both continents, increases should be seen in the use of fourth-generation languages and in the Ada programming language, for engineering applications. The level of COBOL use should stay the same in Europe, but should decline in the States over the next two years.

Myriad CASE Cultures

It's impossible to characterize a typical European CASE user. Many differences prevail between European countries in language, corporate culture, budgets, role of government and training of software developers.

The Scandinavian countries are far more advanced in using software engineering principles and CASE tools than are other European countries. "Companies in these countries are much more receptive to the usage of structured methods, as well as consulting, to aid in the transfer of CASE technology into their organization, relative to their peers in the U.S.," says Larry Howard, director of worldwide sales and marketing for Texas Instruments' CASE products. However, due to the smaller economies, the potential market for CASE tools in the Scandinavian countries is inherently not as large as it is in Britain, France, Italy or West Germany.

France has the potential to become a substantial market for CASE tool use, thanks in large part to the high level of education and training of its software developers. Structured analysis and design methods such as Merise are used routinely to develop software in IS shops where CASE tools have not been installed. Cheryl Gerelle, head of Digital's CASE marketing in Europe, agrees. "In a survey done by Digital some time ago, we found that the French were ahead in the usage of structured methods compared to many other countries in Europe," she says.

Another factor in France's favor is that it has the largest share of the estimated $40 billion European software market. However, a major disadvantage to non-French CASE-tool vendors selling in this country is the need for a French-language interface to CASE tools and French-language training manuals. So far, the language barrier has prevented many U.S. vendors from making further inroads into this market.

The West German software market is the second largest in Europe, followed by Britain and Italy. German companies have been more conservative in adopting new software-engineering technologies, compared with other European countries and the United States. "However, more recently, since the AD/Cycle announcements from IBM, the Germans are beginning to sit up and take notice," says Philip Caltabiano, vice president of international sales for KnowledgeWare.

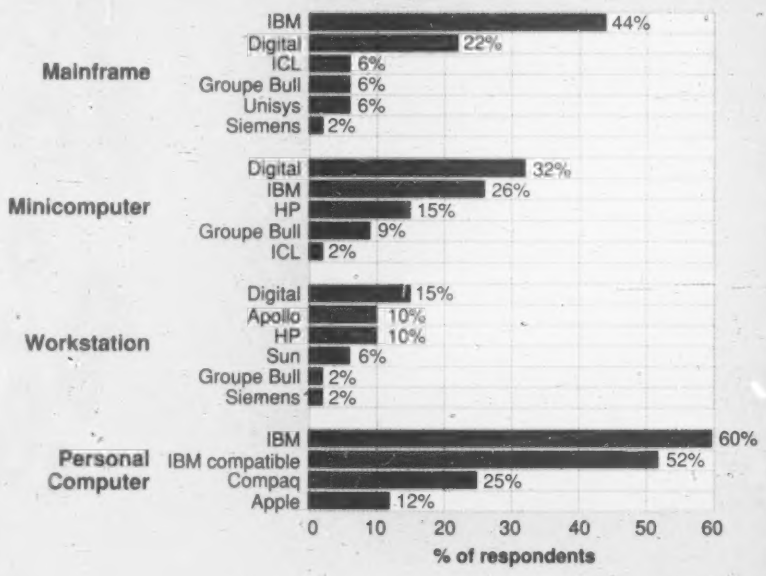
☐ WEST GERMAN FIRMS HAVE BEEN CONSERVATIVE IN ADOPTING CASE.

Gerhard Held, senior director of CASE products at Siemens AG in Munich, agrees. "AD/Cycle has generated a lot of interest in CASE here. It is almost a revolution. There have been numerous seminars and articles in the press on the subject. This has helped generate a lot of CASE tool sales for Siemens in Germany." ▭

Jay Prakash is a founder and principal consultant of Strategic Focus, a consulting and market research firm based in Milpitas, Calif.

Europe's CASE Platforms of Choice

IBM comes out in the lead as the choice for both mainframe and PC software development platforms. Digital holds a stronger position here than in the U.S., however.



Source: Strategic Focus

Business Is Good for Outside Services Vendors

Increased reliance by IS departments on outside resources means swelling revenues for computer services vendors.

BY MADELINE FRANCHI

Use of outside services may contract during weak economic times, but that doesn't seem to be happening to information systems (IS). DATAMATION's surveys of IS budgets show that IS executives are buying more outside services this year and last than they thought they would.

In the 1988/1989 Budget Study, IS execs estimated that an average of 9% of their budgets would be spent for outside services in 1988, with 9% earmarked for such help in 1989. However, respondents to this year's (1989/1990) Budget Study report that outside services actually grabbed a 12.3% chunk of their IS budgets in 1989, and they anticipate a 12.6% allocation for applications development, systems integration, facilities management and other outside resources in 1990.

This increased reliance is good news for those of you in computer and data-processing services. Revenue growth in your industry is surging.

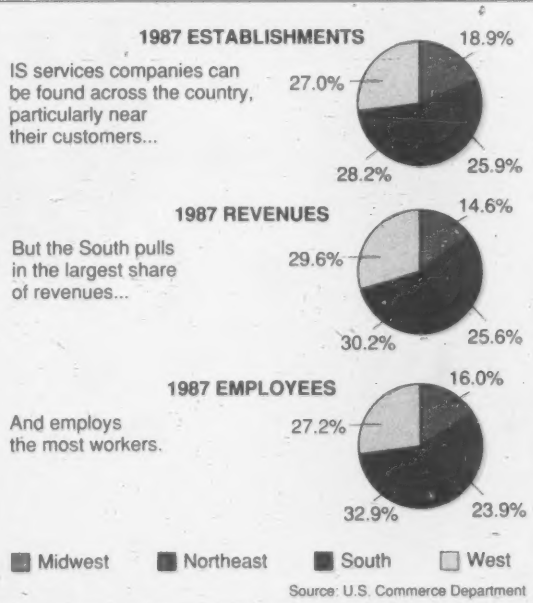
Preliminary figures recently released from the U.S. Commerce Department's Census of Services Industries, conducted every five years, indicate that revenues from establishments primarily engaged in computer programming and software services represented 12.5% of the total business services receipts in 1987. Revenues from programming and software services (which include prepackaged software and integrated systems design) swelled from $8.26 billion in the last census (which reported 1982 data) to over $27.15 billion this time around, a compound annual growth rate of almost 27%. The industry surged from 9,925 establishments nationwide employing 127,122 workers in 1982, to 21,594 establishments with 306,211 employees in 1987.

By region, the Northeast, South and West each account for between 25% and 33% of establishments, revenues and employment. The South predominates, but it covers a large area encompassing 16 states and the District of Columbia. Although it lags behind the other regions, the Midwest still is home to 19% of establishments, takes in 14.6% of the revenues and employs 16% of the industry, according to the most recent census.

But within each region, analysis by state reveals that most of the industry and jobs are actually concentrated on the two coasts, an indication perhaps that the service industries are set up near their customers. Ten states accounted for 71% of the receipts, 69% of employment and 63% of the number of establishments in 1987. Just the top three states combined—California, Massachusetts and Virginia—generated revenues of $10 billion in programming and software, 37% of the total. These three states are the top employers, too, with 35% of the work force—106,995 people. ▭

For more information on Cahners Economics' forecasting services, including seminars, newsletters and diskettes, contact Dan Buchan at (617)-558-4758 or (617)-964-3030, by fax at (617)-558-4402, or write Cahners Economics, 275 Washington Street, Newton, MA 02158.

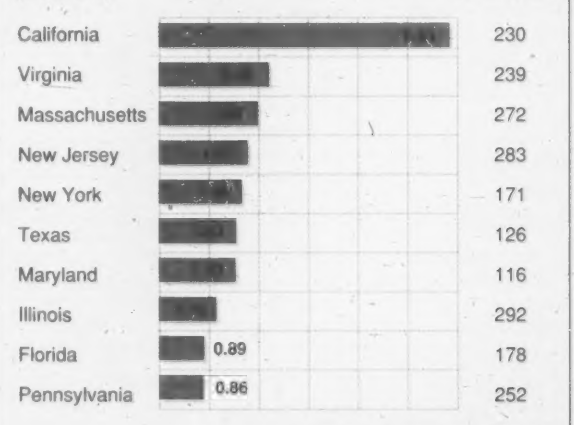
Services Are Booming All Over



Source: U.S. Commerce Department

The Top 10 States in Services

California leads the pack in services revenues, but Illinois, New Jersey and Pennsylvania are on the fastest growth tracks.



Source: U.S. Commerce Department